STRATEGIC CONSTRUCTION MODELING AND DELIVERY
INDUSTRIAL RESEARCH CHAIR

ASSESSING THE EFFECT OF MOTIVATION ON CONSTRUCTION CREW PERFORMANCE

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ABOUT THE CHAIR

Established in January 2012 under the leadership of Dr. Aminah Robinson Fayek, the Industrial Research Chair in Strategic Construction Modeling and Delivery operates within the Department of Civil and Environmental Engineering at the University of Alberta.

The Chair brings together construction industry owners, contractors, and labour groups working in Alberta and across Canada to develop comprehensive research-based solutions to key industry problems. Giving particular attention to Canada's oil and gas, utilities, industrial, and commercial construction sectors, the Chair focuses on strategic concerns related to construction management—such as construction industry productivity, project delivery, and performance. Research undertaken includes improvements to labour productivity, structuring projects and teams, assessing owner and contractor competencies, and reducing project execution risk.

The Chair's research program takes advantage of fuzzy logic's ability to capture and quantify the many subjective uncertainties that challenge construction projects. Researchers combine fuzzy logic with other forms of uncertainty modeling, artificial intelligence, and simulation techniques to develop advanced decision-support tools and approaches.
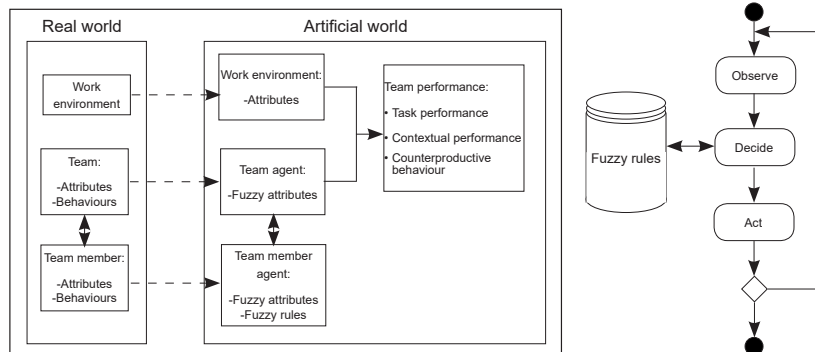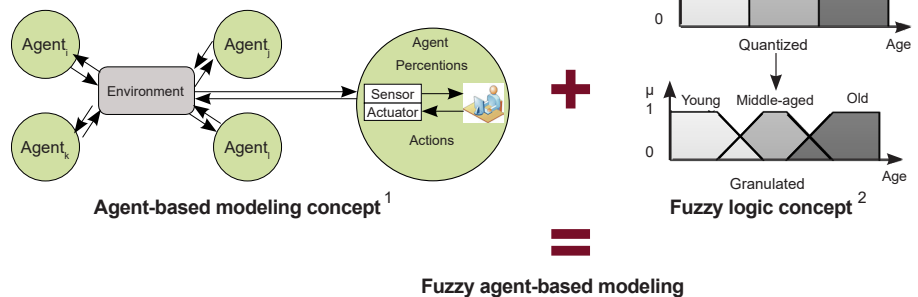
BACKGROUND

- There is a critical gap in existing industry practices regarding the assessment and improvement of construction crew motivation and performance.
- The construction industry has overlooked the influence of the complex interactions that exist among crew members and their impact on crew motivation and performance.
- Agent-based modeling is capable of modeling complex systems of interacting agents.
- Fuzzy logic is able to deal with subjective uncertainty in system variables and interactions.

OBJECTIVES

- Provide the construction industry with a better tool to define, measure, and improve construction crew motivation and performance.
- Help industry to define crew motivation based on recent developments in general management and business fields.
- Develop advanced models capable of analysing complex interactions among project agents by integrating fuzzy logic and agent-based modeling.

METHODOLOGY

Agent-based modeling concept [1]

Fuzzy logic concept [2]

Fuzzy agent-based modeling

PROJECT PARTNERS

NSERC CRSNG

CLAC better together

PCA BUILDING CANADA TOGETHER

INDUSTRY APPLICATIONS AND BENEFITS

- Identified critical factors and practices leading to improved labour motivation and performance metrics (i.e., task performance, contextual performance, and counterproductive behaviour).
- Developed tools for defining and measuring construction crew motivation and performance for construction projects.
- Created advanced models for construction crew performance prediction, helping to prevent, or at least mitigate, common cost overruns and schedule delays.

1 Adapted from: Pedrycz, W., & Gomide, F. (2007). Fuzzy systems engineering: toward human-centric computing. John Wiley & Sons.
2 Adapted from: Zadeh, L. A. (2008). Is there a need for fuzzy logic?. Information sciences, 178(13), 2751-2779.